

Anchorage Amateur Radio Club

General Meeting Friday March 5, 1999

IN THIS ISSUE:

This Month's Events
 Charge It!
 A Primer On Charging
 ARRL Email alias addresses
 HAMS still on hold for ULS
 SUNSAT amateur radio satellite

Wireless Privacy Bill Reintroduced
 QRP Frequencies
 QRP Transceivers for under \$20
 Why QRP? (next months speaker)
 HAM classes (not too late yet)

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One Year Board Members

Dianne Hammer NL7KN
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 Corney Eastman KL0FK
 Richard O'Connor WL7CPG
 Dave Filley WL7CDJ

AARC web page & Email contact addresses:

<http://kl7aa.akconnect.com>

president to windsman@alaska.net

webmaster to kl7aa@lawson.akconnect.com

membership to frederickson@iname.com

activities to johnlynn@gci.net

News Letter Submissions, Information or corrections:

Submissions must be received 2 weeks before meeting

Email: KL0CY@arrl.net Facsimile: 907-338-4791

Mail: 7013 Trafford Ave. Anchorage 99504

KL7G CODE PRACTICE SCHEDULE

Schedule: 7:00am, 10:00am, 4:00pm, 7:00pm, 10:00pm
 AK time, every day Frequencies: 3575 Khz, 7075 Khz &
 145.35 Mhz. Sending Speeds: 22 wpm, 15 wpm, 7 wpm

Nets in Alaska:

The following nets are active in South-central Alaska:

Alaska Sniper's Net 3.920 MHz 6:00 PM daily

Alaska Bush Net 7.093 MHz 8:00 PM daily

Alaska Motley Net 3.933 Mhz 9:00 PM daily

Alaska Pacific Emergency Preparedness Net 14.292 MHz
 8:30 AM M-F

QCWA net 146.97/.37 repeater Sundays 8:00 PM local

850 No Name Net 146.85/.25 repeater Sundays 8:00 PM

Son of Sideband Net 144.20 USB Mondays 9:00 PM local

Big City Simplex Net 146.520 FM Tuesdays 8:00 PM local

ARES net 147.30/.90 Mhz Thursdays at 8:00 PM local

PARKA net 147.30/.90 Mhz Thursdays at 9:00 PM local

Anchorage & Mat Valley Area Repeaters

KL7AA systems at Flattop Mt., 2,200 ft

146.34/94 Mhz, 80 watts, autopatch, 100/141.3 Hz PL

223.34/224.94, 25 watts, no patch, no PL

444.70/449.70, 25 watts, autopatch, 100/141.3 PL

KL7ION at Mt. Gordon Lyon 4,700 ft

147.30/90 Mhz - 80 watts, no patch, no PL

KL7AA, Mt. Alyeska, 2,400 ft.

146.16/76 Mhz, 25 watts, no patch, 141.3 Hz PL

KL7CC, Anchorage Hillside, SCRC club

146.97/.37 Mhz, autopatch, 103.5 Hz PL

KL7DJE at Grubstake Peak, 4,500 ft.

147.09/.69 Mhz, 25 watts, no patch, 100 Hz PL

444.925/449.925, 10 watts, no patch, 141.3 Hz PL

KL7JFU, Palmer, MARA club

146.85/.25, autopatch, no PL

KL7AIR Elmendorf, EARS

147.27/.87 no patch, 107.2 Hz PL

KL7G West Anchorage & Events

449.65/444.65 Mhz, patch, no PL

Anchorage & Mat Valley Simplex Frequencies

146.52 Mhz Calling and Emergency frequency

147.57 / 447.57 (crossband linked) HF spotters & chat

146.49 Mhz Anchorage area simplex chat

146.41 Mhz Mat Valley simplex chat

~~~ **HOT LINKS** ~~~

Internet Web links, the favorites from our readers

AARC <http://kl7aa.akconnect.com>

SCRC <http://www.servcom.com/worcester/scrc.htm>

EARS <http://www.qsl.net/kl7air>

KL7J <http://www.alaska.net/~buchholz>

Fairbanks AARC:

<http://ffdlm1mac.uafsof.alaska.edu/aarc/aarc.html>

Yukon Amateur Radio Association:

<http://www.klondike.com/yara/index.html>

HAARP Project:

<http://server5550.itd.nrl.navy.mil/projects/haarp/>

<<Amateur Radio Reference Library>>

<http://www.area-ham.org/library/libindex.html>

Hamradio: <http://www.hamrad.com/>

Solar Terrestrial Activity <http://209.130.27.95/solar/>

ARRL <http://www.arrl.org/>

**Propagation Report Recording 566-1819**

*please let us know if there are other club pages or good starting points that should appear here*

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**VHF NETS AROUND**

All HAMs take note: there are lots of nets and nice folks to visit with. The Son of Sideband Net runs each Monday night at 9:00 PM local on 144.200 MHz USB, with a 6 Meter extension on 50.200 MHz USB. On Tuesday night, the Big City Simplex Net operates on 146.520 FM at 8:00 PM local with a 70cm checkin on 446.00 FM and a 6M checkin on 52.525 FM immediately following. On Thursday the ARES net starts at 8:00 PM on the 147.30/.90 repeater with Amateur News line followed at 9:00 PM by the PARKA net. On Sunday there are two nets at the same time. In Anchorage, the QCWA net runs at 8:00 PM on the 146.97/.37 repeater (103.5 Hz PL) and in the valley the 850 No Name Net runs on the 146.85/.25 repeater.

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**This Month's Speaker**

There will be a discussion of lessons learned from recent volunteer events and a message formatting and traffic handling session.

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**ABACUS RADIO REPAIR**

Factory authorized service for: Kenwood, ICOM, Yaesu, Alinco, Amateur radio equipment.

Call Jim Wiley, KL7CC (907) 338-0662

**NEWSLETTER ARTICLES:** All articles from members and interested persons are very welcome. If you wish to submit any articles, jokes, cartoons, please have it typed or

neatly handwritten. It can be submitted by computer disk, fax, or E-mail to the newsletter editor at the address listed on the cover. Submissions must be in the hands of the editor at least two weeks prior to the meeting.

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**Regular HAM Gatherings:**

\* **Tuesdays, 11:30 AM to 1:00 PM:** Join the gang for lunch and an eyeball QSO at the Royal Fork, Penland Park, East.

**Saturdays, 7:30 AM:** Here is a great way to get started on the week-end come and meet with some of the locals and have a great breakfast at Phillips Restaurant, at the corner of Arctic and International. Great Fun.

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**THIS MONTH'S EVENTS**

**March 3: VE License Exams 6:30 PM** Carr-Gottstein Building, APU Campus. Bring photo ID, copy of license (if any) and any certificates of completion.

**March 5: ARRC general meeting at 7:00 PM** The meeting will be at the Carr-Gottstein Building, on the APU Campus. Talk in will be on 147.300.

**March 6: The Iditarod Start on 4<sup>th</sup> Avenue at 10 AM** with lots of work leading up to it. Downtown simplex 146.55, checkpoints on ARES repeater 147.30/90 MHz.

**March 7: The Iditarod RE-start at the new Wasilla airport:** with lots of work leading up to it. Downtown simplex 146.55 MHz.

**March 12: SCRC general meeting at 7:00 PM** room 220, Business Ed. Bldg., UAA campus. Talk in on 147.57 simplex.

**March 13: ARES Planning Committee 9:30 AM.** Note that the date has been moved this month to avoid a conflict with the Iditarod. It will be at the American Red Cross at 8<sup>th</sup> and Cordova. Everyone welcome. Focusing on preparedness and training.

**March 13: VE License Exams.** Hope Cottage Offices, 540 W. International in the Board Room. At 2:00 PM. Be sure to bring photo ID, copy of license (if any) and any certificates of completion.

**March 26: MARA meeting** at the MTA office in Palmer at 7PM

The following article appeared in "9-1-1 Magazine".

Contact information for the author is:

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These articles contain a good plain English discussion of Ni-Cad battery charging techniques and common problems. The care and feeding of Ni-Cad's is especially relevant with all of the Fur Rondy, Dog Racing and many other events that we HAMs bring out our hand held radios and usually ignored battery packs to provide volunteer communications. The MAHA universal charger seems to work well for charging and conditioning Ni-Cad's. The second article describes a new charging technique that claims to eliminate the need to "manage" batteries by periodically reconditioning them. These new chargers are only available for several commercial radio packs. Perhaps if enough of us ask they will come up with an offering for some of the common HT's that HAMs use. *editor*

### **Charge It!**

A Public Safety Guide to Battery Maintenance

by Jody Steinberg

"There's nothing worse than picking up your radio up and finding it dead," says Dennis Granger of Grant Park, Illinois, Sheriff's Department.

It's happened to everyone. Fast moment, life-or-death communications. All contact lost because the radio goes dead or all you hear is static. How can radios, the lifeline of your work, be so unpredictable? Actually, they're not it's the battery, and how you manage it every day of the year that often determines the dependability of the radio.

For most public safety and emergency professionals, operating a "Battery Maintenance Program" is low on the list of priorities in day-to-day operations. Bigger operations employ a Communications Officer to help manage equipment and channels. But taking care of the battery is usually the responsibility of the individual, which isn't so hard to do once you understand batteries.

Three types of batteries are commonly used for portable communications: Nickel Cadmium (NiCd), Nickel Metal Hydride (NiMH) and Lithium Ion (Li Ion). For years, NiCd has been the workhorse of rechargeables. It gives the best value for the money, costs less and provides more charge/discharge cycles than its counterparts. But it is

heavier, and can demonstrate problems such as memory effect, which reduces charge capacity and cycle life. NiMH and Li Ion are lighter and have higher capacity than NiCd, but each chemistry has its own drawbacks: high costs, short cycle life and limited power capabilities. And, NiMH also has a memory effect.

Naturally, given the lower cost and longer life, NiCd is the battery of choice for most public safety operations. When misused, NiCd batteries can create frustration and "burn out" early, causing communications breakdown. However, when properly handled, NiCd batteries do the job dependably and save money.

When a battery is frequently charged before it is fully discharged, it begins to "remember" the level at which it was last charged, and it begins to think that is the maximum level of capacity. Gradually, the usable time between charges is reduced, until a battery capable of lasting 12 hours can be reduced to only two or three hours. This is "memory effect," which also reduces the life of the battery. Two-way radio NiCd batteries should last at least 700 charge/discharge cycles, but that's not the case in operations where no concern for battery chemistry is applied to daily usage. Memory effect is cumulative, so it builds up over time.

John E. McGuire, Operations Liason at the Unified Port District in San Diego, understands how memory effect can shorten battery life. "Batteries have been a very sore subject around here for a long time," he explains. "Even after we got the OEM upgrade charger, we thought we were just out of luck with batteries and that we would continue to replace them every six months."

"I have to change our batteries about every year because of the memory effect. Batteries aren't lasting long like they are supposed to," echoes Dennis Granger.

The key to battery success lies in the charging. You can use or abuse your battery, but if you charge (and discharge) it properly, it will serve you well for a long, long time. At Gwinnett County Police Department (GA), batteries last up to four years, because officers are trained in proper usage and charging practices.

"Each officer has two batteries and a trickle charger at home," explains Lamar Martin, Gwinnett's Radio System Coordinator. "They work six days on and three off. They use one battery one week, another battery the next. At the end of six days, they leave the radio on until it runs down to full discharge. Others charge and discharge every day they work. The batteries are lasting a 10-hour shift at a time, and often, into a second shift for a part-time job. I condition the batteries regularly, too. 'Killing' it frequently helps to erase any memory."

There is a variety of equipment on the market for battery maintenance: chargers, conditioners, and analyzers. Chargers replenish the energy storage capacity of the battery. Three main types are available: the constant-current trickle charge (commonly referred to as "roasters and toasters"); the constant high-current fast charger, which is often self-terminating; and the pulse charger, which combines steady positive current with brief negative currents. Dynamic Electrochemical Waveform, the newest technology on the market, takes pulse charging one step further with an intelligent microchip that reads the chemistry of the battery and responds with very high positive current charging interspersed with variable and brief (microseconds) deep discharging currents to condition the battery as it charges. Conditioners "exercise" the battery by discharging it very deeply usually to about 1v/cell. This "cleans" the battery and helps undo the damage of memory effect. Analyzers measure the capacity of the battery and sometimes measure changes in capacity. Some analyzers can also determine the cause of a bad battery, i.e. external damage, bad condition or bad cell. Most analyzers discharge the battery fully and then recharge it to measure capacity. Every time this is done, one cycle is erased from the battery's life span.

Many people mistakenly think that battery management needs to be a labor-intensive process with communications professionals. Myth. Every single person with a radio can be proactive in making his/her battery last longer. Here are a few simple steps you can follow to assure the best possible battery maintenance program with the lowest possible investment in time and equipment:

1. Drain your battery before charging as much as possible. It sounds simple, but few people actually do it. In an ideal world, every user would have a spare battery that is always ready to go while the other is discharged and recharged. Drain the battery by leaving the radio turned on until the battery can no longer power the radio at all. If the length of your shift and access to a charger doesn't permit you to run the battery down before recharging it daily, do it at least once every 7-14 days. Don't drop the battery/radio in the charger throughout your shift when it isn't in use. Let it run down a full shift!

2. Terminate charging, don't leave your battery to charge indefinitely. If your charger is not self-terminating, buy an inexpensive outlet timer. If it takes eight hours to charge your battery have the timer stop at eight hours. Don't allow excessive heat or overcharge your battery by leaving it in charge all night or weekend.

3. Condition your battery. NiCd batteries perform best if they are periodically "exercised." A good conditioner will fully discharge the battery bringing the voltage down far lower than the discharge achieved from running down the radio. This helps to erase any memory-effect. Label the batteries and

establish a chart to remind everyone when a battery is due for conditioning.

4. Invest in a good charger. Many departments buy the best radios, and then take basic, inexpensive OEM (Original Equipment Manufacturer) "trickle chargers" as an afterthought. Likewise, manufacturers spend their resources making the best radios for you, then often stick their name on a low-tech, inexpensive charger to bundle with the radio and keep the bid low. The real cost in any durable equipment is operations and maintenance. An investment in a good charger, one that will charge your battery only as much as it needs and then terminate when the battery is fully charged - can bring the long-term costs of your communication system down significantly. Some form of pulse charging, rather than constant current, is also preferable.

5. Monitor your batteries. Label all batteries with the date that they are put into service, and keep track of how frequently they are conditioned. A simple chart is sufficient. Look for patterns in problems. Is it possible that battery problems are more prevalent in one department or a certain shift? Can you track quality problems to a particular batch of batteries based on supply date?

6. Format your battery properly the first time. The life of a battery can be severely shortened in its first day. Follow the manufacturer's directions to fully charge your battery the first time it comes out of the box. If you put it into service prematurely, you have already begun the memory effect problem.

7. Condition your back-up batteries regularly. Avoid a crisis of bad back-up batteries by taking a proactive approach to maintaining them. Do not leave emergency batteries sitting in non-terminating trickle-chargers or they could fail when you need them most. Again, you can incorporate inexpensive outlet timers to help manage termination and recharging. Left off of charge, up to 20% of the energy will drain but temporary capacity loss can be safer than permanent memory effect. If possible, use an intelligent conditioning charger which cycles your batteries regularly without user intervention. If upgrading equipment is not an option, rotate the batteries into service regularly, or condition them. At least once a month, batteries which are charged regularly without being used need to be fully discharged before recharging.

"Prior to getting our new smart chargers, if anyone asked me how to make a battery last longer, I say turn it on, leave it on scan, and when the radio's really dead, charge it," says Tracy Roberts, Radio Systems Specialist at Cobb County 9-1-1 in Georgia. "My husband's in law enforcement. I told him to take care of his batteries and his was the only battery that lasted the whole shift."

Two recent events in South Africa illustrated how critical good batteries can be in an emergency. In April, during

severe flash-flooding off the cape of South Africa, Mossel-Bay township emergency workers found themselves out of radio communications when constant talk-time wore the batteries down quickly and back-up batteries and chargers failed to return the radios to service in a timely fashion. Thanks to the initiative of Graeme Wells, ACT Pty. Ltd., who drove 3.5 hours to Mossel Bay to help out, new charging technology was used to fast charge the batteries and get the radios back into service (see p. 10). Only weeks earlier, forest fires swept another area of South Africa, and then, too, communications workers found themselves out of contact because back-up batteries were dead. Similar concerns have been echoed by fire and rescue workers here in the United States, prompting the introduction of a smart charger which will maintain your back-up batteries by charging and discharging automatically without overcharging or heating them.

"It's great when a charger stops when it's finished. It keeps them from cooking. The guys all leave their batteries in the charger overnight and they're just cooking slowly the whole time it's so bad for the batteries," explains Paul Smith of the San Bernardino County (CA) Radio Operations Group. "On the other hand," he adds "they'll warm your hands on a cold morning!"

### **A Primer On Charging**

by Jody Steinberg

The standard OEM battery charger is a "constant current trickle charger," which operates by delivering a steady, low-level, positive current for as long as it is connected to a power supply. These slow, "overnight chargers" charge a battery in approximately ten hours and rely on the user to stop them when the battery has reached its maximum capacity. Energy-storing ions are generated at one electrode in a battery cell and must move to the other electrode. If the current is sustained over an extended period of time, the ions concentrate on one side and create polarization, which causes heat generation, inadequate charging capacity, and a shorter life for the battery. Although they are an inexpensive consideration when purchasing a two-way system, they can significantly increase the cost of operating and maintaining the system. The low charge rate allows the chemical reactions to localize on the electrode surface, leading to dendrite growth. There is a high likelihood of overcharging, and, in the case of NiCd and NiMH, if the battery isn't discharged first, voltage depression, or "memory effect" begins to occur.

Most fast chargers operate by increasing the constant current rate, charging the battery in only two or three hours. They usually have basic circuitry that terminates when the battery is fully charged, or decreases the charge current when the battery reaches a certain voltage, usually about 80%-90% charged. However, charging at a high constant current rate ignores the electrochemical process within the battery, which,

over time, causes significant deterioration, similar to, or worse than the trickle charger. The result is reduced capacity with each charge, untimely wear-down, and fewer charge/discharge cycles for the battery.

Pulse-charging, introduced in the 60s, was the first improvement to the constant current trickle charge. Pulse charging surges power into the battery in 1-second pulses of electrical current interspersed with fraction-of-a-second rest periods. Interrupting the pulse current gives ions a chance to diffuse and distribute more evenly throughout the battery, routinely return to normal levels and reducing some negative effects of trickle charging. While developed to address the chemical process of batteries, pulse charging still ignores the chemical reaction and physical phenomenon taking place within the battery and the likelihood of the battery not being fully discharged. It's short-term fix is negated by shortened battery life and reduced charge capacity, which translates to batteries not lasting a shift between charges, or a year out of the box.

A second generation of pulse charging emerged in the 1970s. Used only in a few high-end chargers, this method augments the rest period by adding a very short negative discharge pulse (dipole pulse) interspersed with the positive charging pulses. The dipole pulse is 2.5 times as strong as the charge pulse and is followed by another rest period. For many, this method seemed to solve some of the problems of traditional charging. The shortcoming to this approach is that the ion transport problem gets progressively worse as the battery is charged. This method can only gain limited information about the state of the battery and the charge current cannot exceed the level which is acceptable at the end of the charge, when conditions are most limiting.

Even the OEM conditioners do not discharge the voltage low enough to recapture all the hidden capacity lost to memory effect. However, a recently discovered algorithm [pattern of current] discharges to the lowest possible level to return hidden memory capacity.

Yury Podrazhansky, Vice President of Research at Advanced Charger Technology (ACT), discovered that single, high-magnitude negative pulses cause ion transportation problems in the reverse direction, as well as excessive discharge of the battery, which increases charge time. He also found that applying even shorter, multiple negative pulses with a much higher magnitude eliminates charging problems and actually benefits battery chemistries. The larger magnitude discharge pulses are inherently focused in the area of dendrites and help to remove them. When allowed to build up, dendrites can short-circuit a battery's electrodes. The brief, high currents rapidly balance the ion concentration and improve the crystalline structure of the electrodes. In NiCd batteries, they momentarily pull the battery voltage down, resulting in the reversal of voltage depression. The improved balancing of ion concentration leads to a highly efficient charge process that

enables a much higher charge current, yielding the shortest charge times possible and uniquely conditioning batteries as they are charged, eliminating the need to discharge first. Podrazhansky patented his discovery and named it Dynamic Electrochemical Waveform™ (DEW) technology a charging waveform which intersperses variable length positive charging waves with multiple negative discharge waves.

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#### ARRL Email alias addresses

From: Shelley, Barry, N1VXY  
Sent: Wednesday, January 27, 1999 2:37 PM  
To: All ARRL Mail Users  
Subject: New Member Service

Beginning Monday, February 1st, the ARRL will be offering a new service to our members, the ARRL E-mail Forwarding Service. This service will be provided free of charge to any member wishing to participate. On Monday, members will be able to subscribe to this service that will provide them an e-mail address at ARRL.net (generally [callsign@arrl.net](mailto:callsign@arrl.net)) Mail sent to this address will be automatically forwarded to a real e-mail address of the member's choosing. Basically, the service provides two benefits to members. It provides members the opportunity to associate with the League by having an ARRL.net (notice, please it is NOT an arrl.org address!) while at the same time, simplifies the process of ever changing e-mail addresses.

As with any new offering, there are bound to be questions. The following is intended to help anyone who may be asked about the service in the course of other, regular communications with our members.

First, it is important to understand that the service is simply a "forwarding" service for electronic mail. Members must have an existing e-mail account to be able to subscribe to the service. No e-mail will be kept on any ARRL computer or mail server. It is simply a "pass through" point.

We would like members to understand that the EASIEST and FASTEST way to subscribe to the service is from the ARRL Members Only web page. If a member is not already a subscriber to the Web page you should encourage them to do so. There will be a separate page of instructions for those wishing to subscribe to the E-mail Forwarding Service.

If a member has an e-mail account, but not Web access, they can still subscribe to the service by sending an e-mail message to [subscribe@arrl.net](mailto:subscribe@arrl.net). This will generate an automated response including a form with instructions on how to subscribe via e-mail. It's as simple as that. Just so you know, these subscription requests will be manually entered in the system and, depending on the number received at any one

time, will most likely take longer to implement than subscribing through the Web page.

All requests received via the Web page plus those that are manually entered on any one day will be transmitted to the service provider each evening and the e-mail address will be implemented that night through a regular update program.

Detail questions about the service should be addressed to either Don Durand or myself although, through the technology available, we are trying to make the registration process as simple as possible and hope to limit the number of these questions.

Thank you in advance for your help. Barry

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#### HAMS STILL ON HOLD FOR ULS

While the FCC's Wireless Telecommunications Bureau began using the Universal Licensing System (ULS) February 16, hams remain in a holding pattern on ULS until the FCC establishes a ULS Amateur Service database. That's not expected to happen until later this year. This means that hams still must use Form 610 and its variations. These so-called "pre-ULS forms" are valid until further notice. On-line services are limited to Form 900 renewals within 120 days of expiration and Form 610V vanity call sign application. License modifications are not yet available on-line unless done at the same time as a renewal.

The ULS is a new, interactive licensing database that consolidates and replaces 11 existing databases and licensing systems, including the Amateur Service. Among other things, it will replace the venerable FCC Form 610 series with a new Form 605 and provide on-line filing, modification, and renewal for amateurs.

In January, the ARRL petitioned the FCC for minor alterations to the ULS rules. The League said it wants the FCC to continue to issue paper license documents; to come up with a way for applicants not having a Taxpayer Identification Number--typically a Social Security Number--to meet ULS requirements to provide one; and to include on Form 605 a section for Volunteer Examiners to certify that an applicant has met the requirements for a new or upgraded ham ticket.

The FCC subsequently did make provisions to assign TINs to those doing business with the Commission who have no legal way to obtain one. The "assigned" TINs will consist of the letter "A" followed by eight digits. They will not be available to those eligible to hold a Social Security Number. Alien licensees needing an assigned TIN should contact FCC Technical Support at 202-424-1250.

Prior to its latest filing, the ARRL had expressed concerns that the FCC might do away with paper license documents altogether and rely instead on the "license grant"--the virtual document that resides within the FCC's computerized

amateur database. The League pointed out in its January petition that some states regulate possession of scanning receivers but exempt amateurs, and inability to produce a license document could result in "arrest and criminal prosecution as well as seizure of equipment by local law enforcement." The League said hams operating overseas also often must produce a paper document. The ARRL noted that the CEPT agreement requires US hams traveling in CEPT countries to possess a US government-issued license document and that ITU regulations "appear to require" a government-issued license document.

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### **ARLS001 SUNSAT amateur radio satellite "alive"**

After more than a month of delays and aborted launch attempts, the Delta II rocket carrying the South African SUNSAT Amateur Radio satellite and other payloads lifted off February 23 from Vandenberg AFB in California. The SUNSAT team in South Africa reports it has communicated with the new satellite and monitored telemetry. On a communication pass February 25, the team brought one of the satellite's onboard computers, OBC1, to life--"a big step forward," the team said. "The 'jingle' that OBC1 onboard SUNSAT relayed was 'I'm Alive.' Good news indeed." Earlier, SUNSAT relayed the temperature of both its top and bottom plates. "Both temperatures were quite low, which is good for the condition of the batteries," the SUNSAT team said. SUNSAT should be fully operational in about a month. Because of weather and technical glitches, the Delta II vehicle carrying the Advanced Research and Global Observation Satellite (ARGOS) primary payload as well as SUNSAT and the Danish Oersted satellite was put off numerous times since its originally scheduled January 14 launch date. SUNSAT, which stands for Stellenbosch University Satellite, takes its name from the South African university whose students constructed the payload. Stellenbosch professor Garth Milne, ZR1AFH, is heading up the effort. The SUNSAT package includes digital store-and-forward capability and a voice "parrot" repeater that will be used primarily for educational demonstrations. The unit has two VHF and two UHF transmit-receive systems. The latest Keplerian elements and other information are available on the SUNSAT Web site, <http://sunsat.ee.sun.ac.za/news.htm>.

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### **WIRELESS PRIVACY BILL REINTRODUCED**

The Wireless Privacy Enhancement Act of 1999, HR514, has been introduced by Rep Heather Wilson of New Mexico. The measure is aimed at amending the Communications Act of 1934 "to strengthen and clarify prohibitions on electronic eavesdropping, and for other purposes." "HR514 is identical to the amended version of HR2369 that passed the House on a 414-to-1 vote during the last session,"

said ARRL Legislative and Public Affairs Manager Steve Mansfield, N1MZA. The Senate did not act on that measure. The original bill, HR2369, would have banned most types of scanners and scanner listening; however, the bill's sponsor, Rep Billy Tauzin, worked with the ARRL and representatives of manufacturers, public service organizations, and scanner enthusiasts to redraft the bill top to bottom.

HR514 forbids manufacturing or modifying scanners to receive cellular, PCS, or "protected" paging service frequencies. The bill also forbids receiving, divulging, publicizing, or utilizing such communication. The measure is part of a package of legislation introduced early in the session in the expectation that it will pass quickly and help restore Congressional momentum.

Mansfield says, however, that the Senate prospects for HR514 remain murky.

While Amateur Radio appears to be unaffected by the new bill, the League is on record as opposing the expansion of prohibitions on radio monitoring beyond those that now exist to protect the privacy of services that interface with wireline networks.

The bipartisan list of co-sponsors of HR514 includes Reps Tauzin of Louisiana; Markey of Massachusetts; Oxley of Ohio; Eshoo and Rogan of California; Deal of Georgia; Wynn of Maryland; Cubin of Wyoming; Luther of Minnesota; Sawyer and Gillmor of Ohio; and Pickering of Mississippi.

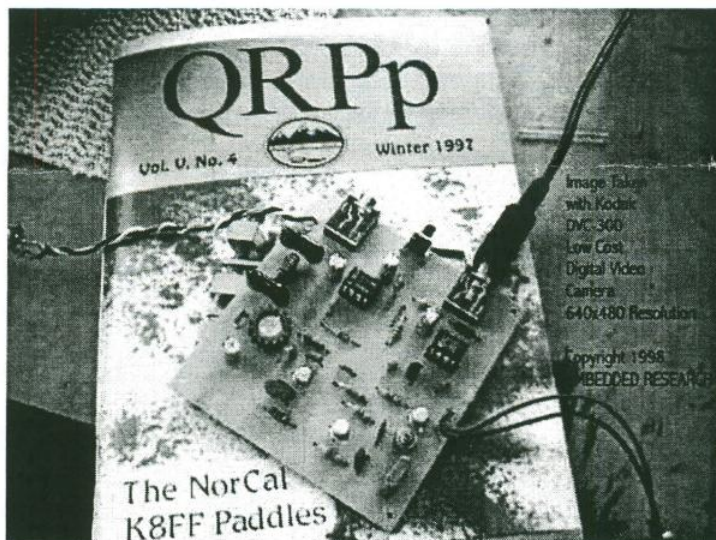
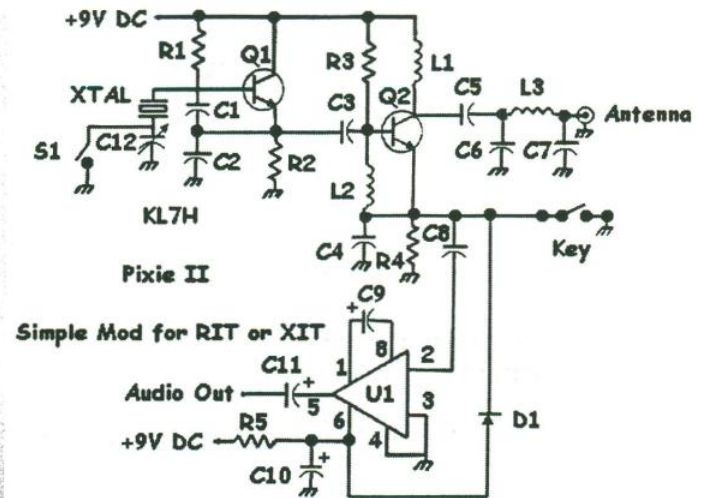
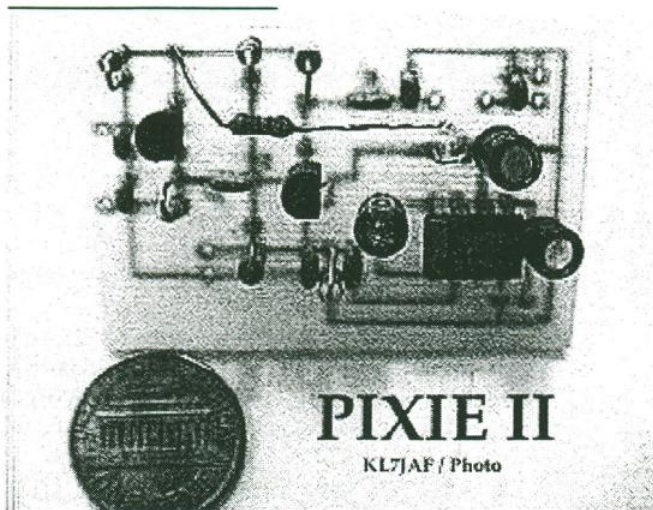
A copy of the bill is available on the Web at <http://thomas.loc.gov/cgi-bin/query/z?c106:h.r.514>.

## **QRP Frequencies**

[http://www.njqr.org/data/qrp\\_freqs.html](http://www.njqr.org/data/qrp_freqs.html)

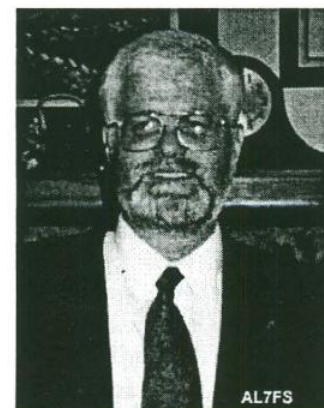
| BAND | CW MHz  | Notes  | Phone MHz | Notes      |
|------|---------|--------|-----------|------------|
| 160m | 1.810   |        | 1.910     |            |
|      |         |        | 1.843     | Europe     |
| 80m  | 3.560   |        | 3.985     |            |
|      | 3.710   | Novice | 3.690     | SSB Europe |
| 40m  | 7.040   |        | 7.285     |            |
|      | 7.030   | Europe | 7.090     | SSB Europe |
|      | 7.060   | Europe |           |            |
|      | 7.110   | Novice |           |            |
| 30m  | 10.106  |        |           |            |
| 20m  | 14.060  |        | 14.285    |            |
| 17m  | 18.069  |        |           |            |
| 15m  | 21.060  |        | 21.385    |            |
|      | 21.110  | Novice | 21.285    | SSB Europe |
| 12m  | 24.906  |        |           |            |
| 10m  | 28.060  |        | 28.885    |            |
|      | 28.110  | Novice | 28.385    | Novice     |
|      |         |        | 28.360    | SSB Europe |
| 6m   | 50.060  |        | 50.885    |            |
|      |         |        | 50.285    | SSB Europe |
| 2m   | 144.060 |        | 144.285   | SSB        |
|      |         |        | 144.585   | FM         |

# QRP Transceivers for less than \$20



**Tixie (TICK Keyer + Pixie)**

**73, Jim, AL7FS**



## QRP Transceiver for less than \$10

by... Jim Larsen - AL7FS

AK/QRP #003

Visit the Alaska QRP Club HomePage at:  
<http://www.ptialaska.net/~bhopskins/akqrp/>

In the last article I covered QRP basics using your current rig for QRP and discussed useful QRP accessories such as a QRP wattmeter and tuner. (<http://www.ptialaska.net/~bhopskins/akqrp/AL7FS1.html>) This month we will take a look at building a functioning transceiver for less than \$10-20 as well as consider a way to use these small QRP rigs for emergency communication in Alaska for hikers and backpackers and just simple fun seekers.

The buzzwords for this month are **Pixie**, **Tixie**, **KnightSMiTe**, **NVIS**, **Altoids**, **Snipers** and **Motley**. Clarifications are in the material below.

And remember, at the April 1999 Anchorage Amateur Radio Club (AARC) Club meeting I will be presenting a comprehensive program titled "Why QRP?". The program, along with copious handouts and examples to touch and feel, will give you a very complete overview of QRP operating and equipment.

### Pixie 2 Transceiver

The first transceiver that has been very successfully built and used on the air is called the "**Pixie 2**" transceiver. This kit has had a history over the past three to four years and has seen much experimentation and modification. The big kickoff for this rig came from Doug Hendricks, **K16DS**, and QRPp magazine (The publication of the NorCal QRP Club). It was originally Published: QRPp June 1995 pp. 45-48 and was billed as "The Great Dayton Building Contest 1995" and was sponsored by the NorCal QRP Club.

This building contest was an endeavor to have fun, promote fellowship, and provide a learning atmosphere. Chuck Adams, **K5FO**, came up with the idea and gave Doug Hendricks, **K16DS**, the job of finding a suitable project that could easily be completed in less than an hour, have readily available parts, and preferably a circuit board. The project that Doug came up with was the Pixie 2, which is a transceiver that can be put on 40 or 80 meters, determined by the crystal frequency chosen and changing one coil. This little rig traces its origins back to where the circuit first appeared in an issue of

the G-QRP Club's "SPRAT" (The QRP Club in Great Britain)

Although most of the QRP circuits today have evolved into using superhet receivers, a diversion back to direct conversion is not unusual...since QRP, after all, is a unique part of amateur radio and simplicity is certainly a part of it.

The Pixie 2 is a tiny rig, with a standard two-transistor transmitter. It's a Colpitts oscillator, left running, and a keyed power amplifier. There is no external mixer used to feed the audio amplifier. Instead, the mixing is done at the final amplifier itself with the resulting audio taken off the emitter.

There's no Receiver Incremental Tuning (RIT), a simple switch and capacitor in parallel, between the crystal will work as an offset though. You'll lose QSK but, here again lies the call for enhancement. The whole idea here was to make a tiny rig that worked, with LOTS of room for improvements, using a minimum of parts.

Many contacts using a simple end fed quarter wave wire, worked against a good ground, have been made with this rig. Most of them have been over hundreds of miles away. The transmit signal is very clean as the oscillator is always running. There are no key clicks. Just listen to it!! Power output is in the 200 to 300 milliwatt range. You'll be amazed what happens at this power level with a decent antenna.

This rig makes contacts spanning hundreds of miles on 80 meters. Band changing is simply a matter of pi-network and crystal changing. If you build one, I'm sure you'll have fun with it. Construction can be by any method, perfboard, "ugly" and pc board. Complete parts kits are available for those of you who are interested.

**KL7H**, Bruce Hopkins, (AK QRP #001) has used the Pixie extensively to check into the Alaska **Snipers** SSB net on 3.920 MHz (6 PM daily) and the Alaska **Motley** Group SSB Net on 3.933 MHz (9 PM daily). He has modified his rig to operate at this higher part of the 75-meter band. In his own words, this is what he has done:

Bruce Hopkins - KL7H [[kl7h@eagle.ptialaska.net](mailto:kl7h@eagle.ptialaska.net)]

"I have used my modified Pixie II for over a year to check in to both the **Snipers** net on 3.920 and the **Motley** Group on 3.933... The only part needed to allow the basic Pixie II, as supplied by HSC Electronics, to work on these frequencies is the

proper crystals... I ordered my crystals from JAN Crystal many years ago to use with simple QRP rigs that I used in the bush, they are a standard crystal so if you already have a box full of surplus FT-243 rocks, they will work just fine...

The Pixie front end is quite wide so copying SSB is not a problem... Many folks have put a 50pf variable capacitor in the ground lead of the crystal to allow transmitter offset... You parallel this variable capacitor with a SPST switch and bypass the capacitor for receive... For SSB receive, I do just the reverse... I open the switch in receive which allows me to tune the receiver enough to clarify the voices... When it is time to transmit, I short out the capacitor which gives the Pixie enough offset to be heard by net control... My Pixie runs about 150 mWatts depending on the state of my 9V battery... I have rarely been unable to check in at this power if I can hear the net... To optimize the transmitter, one needs only to replace the molded chokes with inductors wound on toroids, and the output caps to silver mica... The Pixie II is capable of nearly 1/2 watt output with a 12 volt supply...

Another modification that I use, and find very helpful, is the addition of a **TICK** keyer chip... The TICK does two things for me, it gives me a full iambic keyer in an 8 pin Dip package, and it gives the Pixie sidetone... (The Tick is further described later in this article.) A complete 80 meter transceiver, keyer, key, battery pack, and ear buds can be carried in two Altoid tins...

Take care and have fun... "

72 / 73 / oo's - Bruce - KL7H

Remember, all that's needed to change bands on this rig is change one inductor and the crystal, and you have a rig for another band!! You can use Walkman style headphones, with a mono adapter. There is even enough audio power to drive a speaker. It's not very loud but you can hear easily in a quiet room... neat!!

This rig has been packaged in a 35mm film can, a Tic-Tac box, Sucrets box (easy), just to name a few. The enclosure is up to you. One just big enough to hold the rig and the 9-Volt battery will give you a tiny self-contained unit. The most often used case for this rig and battery seems to be the now popular **Altoids** mints box. This is a perfect size for backpacking or even for keeping in a glove box of the car.

This transceiver can be purchased from HSC in California. Detail is at the end of the article.

## **Tixie Transceiver**

The next extension of the Pixie is called the **Tixie**. This is a newly designed board that incorporates a "TICK" keyer chip (microprocessor controlled keyer in an 8 pin package) onto the board itself. A TICK keyer plus a Pixie transceiver equals a "Tixie" transceiver. Now you have a QRP transceiver with built in keyer for under \$20. This is a bit large (3 inches square) for an Altoids box but is purposely spread out on the PC board to encourage experimentation. The board is available from FAR Circuits, the Pixie parts are again available from HSC, the standard QRP frequency crystals can be bought from NorCal, and the TICK keyer chip can be purchased from Embedded Research. Your miscellaneous parts can be bought at Radio Shack (Frigid North) or pulled from other sources.

## **KnightSMiTe - SMT Technology Rig**

<http://www.waterw.com/~knights/smite.html> is the web page of the KnightLites and for a unique version of the Pixie. It is a Surface Mount Technology (SMT) transceiver kit. The board measures 1" x 1-3/4". The circuit is a much revised Pixie II, that is, a Direct Conversion (DC) receiver and about 100 - 250 mW output. It uses a 3.6864 MHz crystal supplied with the kit. The Knight version has a Variable Crystal Oscillator and offset, so the received signal can be heard even when it zero beats the KnightSMiTe signal. A 9V battery supplies power. The price is \$10 plus \$3 shipping in the U.S. **KL7IKX**, Doug Dickinson, has built and tested one of these QRP rigs and has his mounted with battery in an Altoids box.

## **NVIS Propagation and Hope**

Without some hope of talking to someone, these low power QRP rigs could be a bit frustrating. I would remind you that **KL7H** has added the crystals for both the Snipers and the Motley net to his \$10 rig and he uses it to check into the net. At those 6 PM and 9 PM time slots, there are lots of hams listening around the state. This makes for a good chance of being heard with your QRP rig.

In addition, if you are on a campout you could set up a scheduled time for a friend to listen for you. During the daytime, there is a strong signal propagated via **Near Vertical Incidence Signal (NVIS)** propagation. Even if you place your antenna only 5 feet up in bushes the NVIS portion of your

signal will go straight up and then back down making up to 200 mile contacts very possible. There are QRPers doing tests with NVIS propagation using the Pixie II as the field unit. Each time they move the distance farther and farther out of town and still they are maintaining solid contact. In most tests, the dipole has been strung only 3 to 5 feet off the ground.

This month we have covered information about Low Power, Low Cost QRP rigs and NVIS propagation. These kits can be built easily in an evening and if tuned for the SSB nets in Alaska, can be available as an emergency radio in very little time. The sources are all listed below so that you can order yours today.

Next month I am going to discuss a very educational book recently made available that steps you through building an 80, 40 or 20 meters superhet CW transceiver (2 watts). It also covers all of the theory within the radio. It is called Elmer 101 and was published in the last issue of **QRPp**. In addition, two very small, very good QRP transceivers for under \$100 will be described.

### QRP-L Mail List

As you find a need for more help in your homebrew endeavors, you should consider subscribing to the every growing QRP-L mail-list by going to the QRP Internet Club at <http://qrp.cc.nd.edu/QRP-L/>. Go to member information and subscribe. See you there!

### Additional Information

Some material in this article was taken from and thanks go out to:

1. **QRPp** June 1995 pp. 45-48 referenced in <http://www.qsl.net/we6w/projects/pixie2.txt>  
With further references: The Pixie 2: An Update by Dave Joseph, **WA6BOY**
2. Embedded Research - Tick Keyers and Tixie <http://www.frontiernet.net/~embres/tick.htm>  
PO Box 92492; Rochester, NY 14692  
Email: [embres@frontiernet.net](mailto:embres@frontiernet.net)
3. FAR CIRCUITS - <http://www.cl.ais.net/farcir/>  
Tixie Printed Circuit Board; 18N640 Field Court  
Dundee, Illinois 60118; (847) 836-9148  
Email: [farcir@ais.net](mailto:farcir@ais.net) Note: Do NOT order via email
4. KnightLites WebPage: KnightSMiTe <http://www.waterw.com/~knights/>
5. HSC Electronics - Pixie 2 Kit; 3500 Ryder St;  
Santa Clara, CA 95051; 1-800-442-5833
6. WE6W HomePage: Pixie 2 Information <http://www.qsl.net/we6w/>

7. Mouser (for parts): <http://www.mouser.com/>
8. Norcal crystals:  
<http://www.fix.net/~jparker/norcal/kits/kits.htm>
9. NVIS info:  
<http://www.wr6wr.com/Books/NVIS.html>  
<http://www.gordon.army.mil/acd/tcs/hf/2418xtr2.htm>  
<http://prairie.lakes.com/~jstanley/NVISPAT/nvispat.html>  
<http://www.qsl.net/vcars/CARL/NVIS.html>
10. Cool links: <http://www.njqrp.org/data/links.html>
11. Pixie 2 Picture:  
<http://www.ptialaska.net/~bhopskins/akqrp/frpix.html>
12. KnightSMiTe Pictures:  
<http://www.ptialaska.net/~bhopskins/akqrp/klsmcbH.html>  
<http://www.ptialaska.net/~bhopskins/akqrp/klsmppch.html>
13. Tixie Picture:  
[http://www.frontiernet.net/~embres/tixie\\_QRPp.jpg](http://www.frontiernet.net/~embres/tixie_QRPp.jpg)

**AL7FS** was originally licensed as **WN0LPK** in March 1965 (**WA0LPK** from 1965-1985). Jim is a member of the Anchorage Amateur Radio Club and the South Central Radio Club. He has twice been a radio operator in Shaktoolik, Alaska for the Iditarod Dog Sled Race and was the Race Communications Director in 1987. Jim has participated in HF from 160-10 meters (CW and SSB), packet, satellite, 6 meter, UHF, VHF, ATV, EME (2 meter WAS #36), DX, and QRP. QRP has lasted the longest and the strongest - 1970 to 1999.

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# Why QRP?



## **A Report on the Joys of *Low-Power Ham Radio***

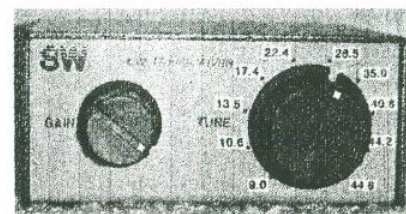
**Presented at the Anchorage  
Amateur Radio Club (AARC)  
meeting on April 2, 1999.**

**7:00 PM at Alaska Pacific University**

**Presented by Jim Larsen, AL7FS  
AL7FS@QSL.NET**



*All Amateur Radio operators of all classes are invited to  
attend this unique presentation of QRP Amateur Radio.  
There will be lots of handouts and QRP gear to see at  
the meeting. Plan to be there and bring a friend.*



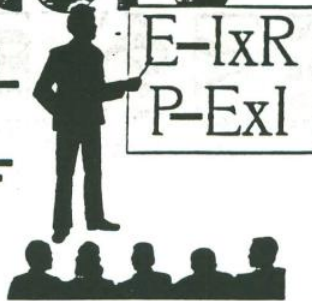
# HAM RADIO CLASSES

## Anchorage Amateur Radio Club

### Instructors

Lil Marvin NL7DL

Rick Marvin KL7YF



Novice - Technician  
-General-  
Classes begin

MARCH 2, 1999

6:00 to 9:00 P.M.



### REQUESTED STUDENT MATERIALS :

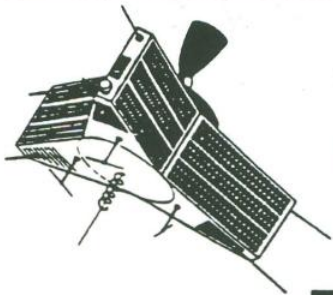
NOVICE: 0-5 WPM ARRL or W5YI Code tapes or equivalent

TECHNICIAN: Gordon West's New No Code Book, or equivalent

GENERAL: Gordon West, ARRL or - General Class Manual + 13WPM code tapes.

Fee : \$35.00

TO REGISTER



Contact the instructors or get materials at  
the Hamfest FEB. 27, 1999

**Begin practicing the code now!!!**

Classes will be held at Red Cross Bldg (2nd Floor)  
8th and Cordova

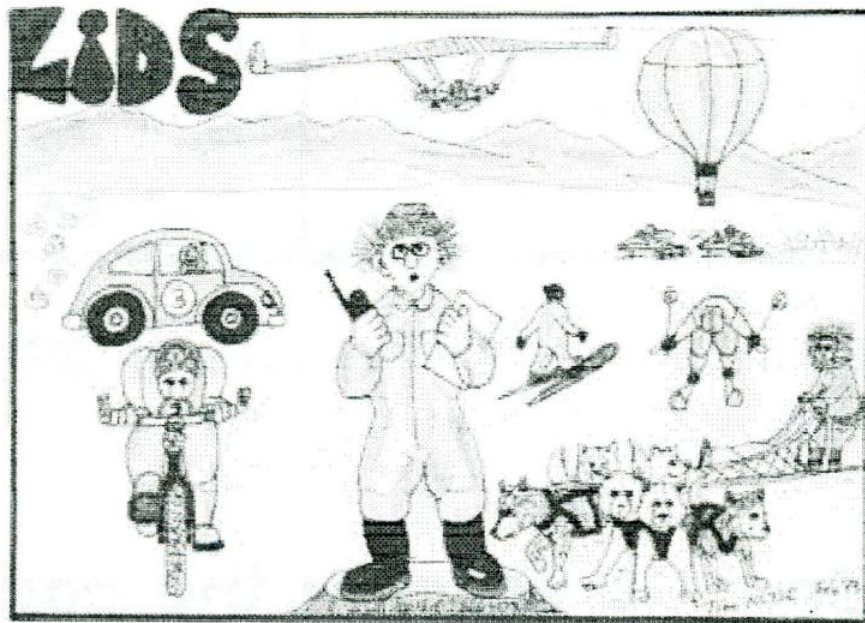
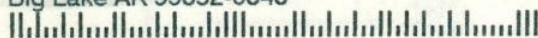
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Stretch, standing on a stump for safety, realized it had finally happened.  
He had been assigned "The Checkpoint From Hell", where everyone held their special event on the same day.